PATENT ABSTRACTS OF JAPAN

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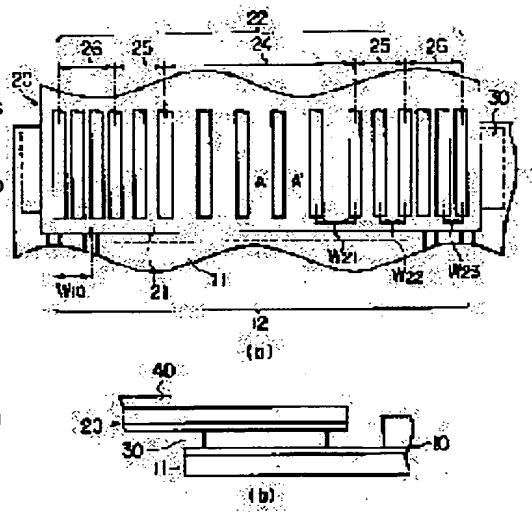
(54) FLEXIBLE BOARD AND DISPLAY USING THE SAME

(57)Abstract:

PROBLEM TO BE SOLVED: To enable improvement of a reliability without causing any improper connection.

SOLUTION: A flexible board (TCP) 20 has a base member 21 and a group of connecting terminals 22. The group of connecting terminals are divided, for example, into first to third blocks of terminals 24, 25 and 26. A pitch W23 of the third blocks of terminals located close to both ends of the TCP 20 is set to become minimum, taking into consideration the fact that the TCP 20, when heated, expands from its both ends. Further, the first block of terminals located in the middle of the TCP 20 is set to become maximum in its pitch. For this reason, heating of the TCP 20 involved during thermocompression thereof to a glass substrate 11 causes the both ends of the TCP 20 to expand largely, whereby the TCP 20 can be bonded to the glass substrate 11 so that the group of connecting terminals coincide with a group of connecting terminals previously formed on the glass substrate as spaced nearly equally.



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CLAIMS

[Claim(s)]
[Claim 1] the 1st base section top characterized by providing the following -- mutual -- abbreviation parallel -- and a flexible substrate connected electrically and mechanically by carrying out thermocompression bonding to an electrode substrate equipped with two or more 1st end-connection children arranged at equal intervals The 2nd base section formed of a member which has a larger coefficient of thermal expansion than said 1st base section Two or more 2nd end-connection children who each other are arranged by abbreviation parallel and connected to said two or more 1st end-connection children on said 2nd base section, respectively A preparation and said two or more 2nd end-connection children are the 1st connection terminal block arranged by said 2nd base section at intervals of abbreviation identitas with said 1st end-connection child. The 2nd connection terminal block arranged at a gap smaller than said 1st connection terminal block, so that it went to both ends of said 2nd base section from said 1st connection terminal block while being located in both sides of said 1st connection terminal block
[Claim 2] the 1st base section top characterized by providing the following -- mutual -- abbreviation parallel -- and a flexible substrate connected electrically and mechanically by carrying out thermocompression bonding to an electrode substrate equipped with two or more 1st end-connection children arranged at equal intervals The 2nd base section formed of a member which has a larger coefficient of thermal expansion than said 1st base section Two or more 2nd end-connection children who each other are arranged by abbreviation parallel and connected to said two or more 1st end-connection children on said 2nd base section, respectively A preparation and said two or more 2nd end-connection children are the 1st connection terminal block arranged by said 2nd base section at intervals of abbreviation identitas with said 1st end-connection child. The 2nd connection terminal block arranged at a gap smaller than said 1st connection terminal block while being located in both sides of said 1st connection terminal block
[Claim 3] It is inserted between a flexible substrate characterized by providing the following, and said electrode substrate and said flexible substrate. A connecting means which connects respectively electrically and mechanically said 1st end-connection child and said 2nd end-connection child by carrying out thermocompression bonding of said both substrates, A preparation and the 2nd end-connection child of said flexible substrate While being located in both sides of the 1st connection terminal block arranged by said 2nd base member at intervals of abbreviation identitas with said 1st end-connection child, and said 1st connection terminal block A display characterized by including the 2nd connection terminal block arranged at a gap smaller than said 1st connection terminal block, so that it went to both ends of said 2nd base member from said 1st connection terminal block A display means to display an image according to a picture signal in order to accept a picture signal in said display means -- the 1st base member top -- abbreviation parallel -- and an electrode substrate equipped with two or more 1st end-connection children arranged at equal intervals The 2nd base member formed of a member which has a larger coefficient of thermal expansion than said 1st base member A driving means which supplies a picture signal to said electrode substrate since it prepares for this 2nd base member and said display means is driven, and two or more 2nd end-connection children who each other are arranged by abbreviation parallel and connected to said 1st end-connection child on said 2nd base member, respectively

[Claim 4] the 1st base section top characterized by providing the following -- mutual -- abbreviation parallel -- and a flexible substrate connected electrically and mechanically by carrying out thermocompression bonding to an electrode substrate equipped with two or more 1st end-connection children arranged at equal intervals The 2nd base section formed of a member which has a larger coefficient of thermal expansion than said 1st base section Two or more 2nd end-connection children who each other are arranged by abbreviation parallel and connected to said two or more 1st end-connection children on said 2nd base section, respectively A scale formed in the direction which intersects perpendicularly to a direction where said 1st and 2nd end-connection children are arranged at a single string A preparation and said two or more 2nd end-connection children are the 1st connection terminal block arranged by said 2nd base section at intervals of abbreviation identitas with said 1st end-connection child, and the 2nd connection terminal block arranged at a gap smaller than said 1st connection terminal block, so that it went to both ends of said 2nd base section from said 1st connection terminal block while being located in both sides of said 1st connection terminal block.

[Claim 5] the 1st base section top characterized by providing the following -- mutual -- abbreviation parallel -- and a flexible substrate connected electrically and mechanically by carrying out thermocompression bonding to an electrode substrate equipped with two or more 1st end-connection children arranged at equal intervals The 2nd base section formed of a member which has a larger coefficient of thermal expansion than said 1st base section Two or more 2nd end-connection children who each other are arranged by abbreviation parallel and connected to said two or more 1st end-connection children on said 2nd base section, respectively A scale formed in the direction which intersects perpendicularly to a direction where said 1st and 2nd end-connection children are arranged at a single string A preparation and said two or more 2nd end-connection children are the 1st connection terminal block arranged by said 2nd base section at intervals of abbreviation identitas with said 1st end-connection child, and the 2nd connection terminal block arranged at a gap smaller than said 1st connection terminal block while being located in both sides of said 1st connection terminal block.

[Claim 6] It is inserted between a flexible substrate characterized by providing the following, and said electrode substrate and said flexible substrate. A connecting means which connects respectively electrically and mechanically said 1st end-connection child and said 2nd end-connection child by carrying out thermocompression bonding of said both substrates, A preparation and the 2nd end-connection child of said flexible substrate While being located in both sides of the 1st connection terminal block arranged by said 2nd base member at intervals of abbreviation identitas with said 1st end-connection child, and said 1st connection terminal block A display characterized by including the 2nd connection terminal block arranged at a gap smaller than said 1st connection terminal block, so that it went to both ends of said 2nd base member from said 1st connection terminal block A display means to display an image according to a picture signal in order to accept a picture signal in said display means -- the 1st base member top -- abbreviation parallel -- and an electrode substrate equipped with two or more 1st end-connection children arranged at equal intervals The 2nd base member formed of a member which has a larger coefficient of thermal expansion than said 1st base member A scale formed in the direction which intersects perpendicularly to a direction where it is arranged by abbreviation parallel mutually a driving means which supplies a picture signal to said electrode substrate since it prepares for this 2nd base member and said display means is driven, and on said 2nd base member, and two or more 2nd end-connection children connected, respectively and said 1st and 2nd end-connection children are arranged by said 1st end-connection child at a single string

[Claim 7] It is inserted between a flexible substrate characterized by providing the following, and said electrode substrate and said flexible substrate. A connecting means which connects respectively electrically and mechanically said 1st end-connection child and said 2nd end-connection child by carrying out thermocompression bonding of said both substrates, A preparation and the 2nd end-connection child of said flexible substrate While being located in both sides of the 1st connection terminal block arranged by said 2nd base member at intervals of abbreviation identitas with said 1st end-connection child, and said 1st connection terminal block A display characterized by including the 2nd connection terminal block arranged

at a gap smaller than said 1st connection terminal block, so that it went to both ends of said 2nd base member from said 1st connection terminal block A display means to display an image according to a picture signal in order to accept a picture signal in said display means -- the 1st base member top -- abbreviation parallel -- and two or more 1st end-connection children arranged at equal intervals A scale formed in the direction which intersects perpendicularly to a direction where this 1st end-connection child is arranged at a single string A preparation ****** substrate, the 2nd base member formed of a member which has a larger coefficient of thermal expansion than said 1st base member, a driving means which supplies a picture signal to said electrode substrate since it prepares for this 2nd base member and said display means is driven, and two or more 2nd end-connection children who each other are arranged by abbreviation parallel and connected to said 1st end-connection child on said 2nd base member, respectively

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[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] This invention relates to the wiring structure of displays, such as a liquid crystal display which used a flexible substrate's configuration and this flexible substrate of an end-connection child.
[0002]
[Description of the Prior Art] In recent years, the flat-surface display represented by the liquid crystal display is used taking advantage of the features, such as a light weight, a thin shape, and a low power, compared with displays, such as CRT, in various fields, such as a television display and a display for computer display car-navigation systems.
[0003] The active-matrix mold display with which switching devices, such as a thin film transistor (TFT is called hereafter), are used, and change for every display pixel especially is briskly studied and developed from a good display image without the cross talk between contiguity pixels being realizable.
[0004] The liquid crystal display has the actuation circuit for driving the liquid crystal panel of a active-matrix mold, and this liquid crystal panel etc. The tape career package (TCP is called hereafter) which an actuation circuit is mounted on the flexible base member which an actuation circuit becomes from polyimide etc. with the demand of lightweight[a thin shape and]-izing of a liquid crystal display, narrow-picture-frame-izing, etc., and changes is arranged at the periphery of a liquid crystal panel.
[0005] Drawing 6 is drawing showing the inlet connection of a liquid crystal panel and TCP roughly. The liquid crystal panel has the panel lead section 110 for connecting electrically to TCP the lead wire pulled out from TFT connected to each pixel electrode. Moreover, TCP has the TCP lead section 210 for connecting electrically an actuation circuit and each lead wire pulled out from TFT besides an actuation circuit.
[0006] The panel lead section 110 is formed on a glass substrate 111 and this glass substrate 111, and has the end-connection child 112 of each Kushigata connected corresponding to TFT. The end-connection child 112 is the same pitch W100 altogether. It is arranged by parallel on the glass substrate 111.
[0007] It is formed the substrate 211 made of polyimide system resin, and on this substrate, and the TCP lead section 210 has the end-connection child 212 of Kushigata connected to the actuation circuit. This end-connection child 212 is the same pitch W100 as the end-connection child 112 so that it may correspond to the end-connection child 112 of the panel lead section 110. It is arranged by parallel on the substrate 211.
[0008] And the panel lead section 110 and the TCP lead section 210 perform alignment, and are connected by methods, such as thermocompression bonding, through the anisotropy electric conduction film 300 so that each end-connection child 111 and 211 may face.
[0009] However, since the coefficient of linear expansion of the glass substrate 111 in the panel lead section 112 is smaller compared with the coefficient of linear expansion of the substrate 211 in the TCP lead section 210, when carrying out thermocompression bonding of the end-connection child 112 of the panel lead section 110, and the end-connection child 212 of the TCP lead section 210 with the anisotropy electric conduction film 300, there is a possibility that both may be connected where a substrate 211 is extended more greatly than a glass substrate 111.

[0010] For this reason, although the gap in the abbreviation core of both the substrates 111 and 211 is not so large as shown in drawing 7 , a possibility of shifting so greatly that it going to the both ends of a substrate is high.
[0011] In order to solve such a problem, the layout method as shown below is proposed conventionally. In consideration of the substrate 211 of the TCP lead section 210 expanding by thermocompression bonding, this method contracts beforehand and designs the end-connection child's 212 wiring pitch formed on the substrate 211.
[0012] When the amount of gaps of the end-connection child 212 of the TCP lead section 210 and the end-connection child 112 of the panel lead section 110 by whom the distance from the end-connection child center of group of the TCP lead section 210 to the end-connection child of arbitration was connected after L and thermocompression bonding is set to deltaL, it is assumed that the relation between L and delta L is a linear function as shown by the dotted line of drawing 8 . By calculating experimentally or experientially the amount of gaps of the end-connection child of the outermost edge of the TCP lead section 210 and the end-connection child of the outermost edge of the panel lead section 110 after thermocompression bonding can prescribe this linear function.
[0013] And the end-connection child's 212 wiring pitch [in / as shown in drawing 9 / the TCP lead section 210] W200 The end-connection child's 112 wiring pitch W100 in the panel lead section 110 It is formed so that it may become small. Wiring pitch W200 of the TCP lead section 210 Ranging from the end-connection child center of group to both ends, all are formed identically.
[0014] It asks with the linear function which showed the amount A of gaps by thermocompression bonding with the end-connection child more specifically first formed in the outermost edge on a glass substrate 110 with the end-connection child formed in the outermost edge on a substrate 211 to drawing 8 . and the following formulas when the number of end-connection children currently formed [pitch / of the end-connection child 212 on a substrate 211 / wiring] on the substrate 211 corresponding to W100 and the end-connection child 112 of a glass substrate 111 in the wiring pitch of the end-connection child 112 on W200 and a glass substrate 111 is set to N and W200 =W100- [A/[(N-1) /2]]
It is alike and is the wiring pitch W200 of the end-connection child 212 of the TCP lead section 210 more. It is computable. And this computed wiring pitch W200 It is based and the end-connection child 212 is formed on a substrate 211.
[0015]
[Problem(s) to be Solved by the Invention] However, amount of gaps deltaL of the end-connection child 212 of the TCP lead section 210 and the end-connection child 112 of the panel lead section 110 who were connected after the distance L from the end-connection child center of group of the TCP lead section 210 to the end-connection child of arbitration and thermocompression bonding has the relation specified by the nonlinear function as shown as the continuous line of drawing 8 . For this reason, although the amount of gaps of the end-connection child near the center of a connection terminal block and near an outermost edge becomes small, the amount of gaps in the other end-connection child has a high possibility of becoming large.
[0016] Therefore, the problem of an end-connection child's alignment precision falling and a faulty connection or the reliability of connection falling arises. Moreover, alignment of the end-connection child 112 of the panel lead section 110 and the end-connection child 212 of the TCP lead section 210 is performed by viewing of an operator through the optical instrument. However, the accumulation pitch which accumulated the pitch between all end-connection children may be unable to be uniformly manufactured with the fabrication precision of the equipment which manufactures the panel lead section 110 and the TCP lead section 210. In this case, when alignment of the end-connection children 112 and 212 is carried out, gap arises. That is, when alignment is carried out on the basis of the center section of the end-connection child 112 and the end-connection child 212, gap arises in the both ends of the panel lead section 110 and the TCP lead section 210. When this amount of gaps is the amount of gaps in tolerance (i.e., within the limits which faulty connections, such as an open circuit, do not produce), based on decision of an operator, alignment is carried out so that the amount of gaps of both ends may become equal on the

basis of an end-connection child's center section. For this reason, when an end-connection child's alignment precision falls, a possibility of producing a faulty connection increases and there is a possibility of falling the yield.

[0017] Then, the object of this invention is to offer flexible substrates, such as TCP whose reliability can improve, and the display using it, without accomplishing in view of a situation which was mentioned above, and producing a faulty connection.

[0018]

[Means for Solving the Problem] In order that this invention may attain the above-mentioned object, to abbreviation parallel mutually on the 1st base section and by carrying out thermocompression bonding to an electrode substrate equipped with two or more 1st end-connection children arranged at equal intervals The 2nd base section formed in a flexible substrate connected electrically and mechanically of a member which has a larger coefficient of thermal expansion than said 1st base section, On said 2nd base section, it is mutually arranged by abbreviation parallel and has two or more 2nd end-connection children connected to said two or more 1st end-connection children, respectively. Said two or more 2nd end-connection children While being located in both sides of the 1st connection terminal block arranged by said 2nd base section at intervals of abbreviation identitas with said 1st end-connection child, and said 1st connection terminal block A flexible substrate characterized by including the 2nd connection terminal block arranged at a gap smaller than said 1st connection terminal block is offered, so that it goes to both ends of said 2nd base section from said 1st connection terminal block.

[0019] According to this invention, to abbreviation parallel mutually on the 1st base section moreover, and by carrying out thermocompression bonding to an electrode substrate equipped with two or more 1st end-connection children arranged at equal intervals The 2nd base section formed in a flexible substrate connected electrically and mechanically of a member which has a larger coefficient of thermal expansion than said 1st base section, On said 2nd base section, it is mutually arranged by abbreviation parallel and has two or more 2nd end-connection children connected to said two or more 1st end-connection children, respectively. Said two or more 2nd end-connection children A flexible substrate characterized by including the 1st connection terminal block arranged by said 2nd base section at intervals of abbreviation identitas with said 1st end-connection child and the 2nd connection terminal block arranged at a gap smaller than said 1st connection terminal block while being located in both sides of said 1st connection terminal block is offered.

[0020] Furthermore, in order to accept a picture signal in a display means to display an image according to a picture signal, and said display means according to this invention On the 1st base member, to abbreviation parallel And an electrode substrate equipped with two or more 1st end-connection children arranged at equal intervals, The 2nd base member formed of a member which has a larger coefficient of thermal expansion than said 1st base member, A driving means which supplies a picture signal to said electrode substrate since it prepares for this 2nd base member and said display means is driven, With two or more 2nd end-connection children who each other are arranged by abbreviation parallel and connected to said 1st end-connection child on said 2nd base section, respectively A connecting means which connects respectively electrically and mechanically said 1st end-connection child and said 2nd end-connection child by being inserted between a flexible substrate which ****, and said electrode substrate and said flexible substrate, and carrying out thermocompression bonding of said both substrates, A preparation and the 2nd end-connection child of said flexible substrate While being located in both sides of the 1st connection terminal block arranged by said 2nd base section at intervals of abbreviation identitas with said 1st end-connection child, and said 1st connection terminal block A display characterized by including the 2nd connection terminal block arranged at a gap smaller than said 1st connection terminal block is offered, so that it goes to both ends of said 2nd base section from said 1st connection terminal block.

[0021] According to this invention, to abbreviation parallel mutually on the 1st base section furthermore, and by carrying out thermocompression bonding to an electrode substrate equipped with two or more 1st end-connection children arranged at equal intervals The 2nd base section formed in a flexible substrate

connected electrically and mechanically of a member which has a larger coefficient of thermal expansion than said 1st base section, With two or more 2nd end-connection children who each other are arranged by abbreviation parallel and connected to said two or more 1st end-connection children on said 2nd base section, respectively It has a scale formed in the direction which intersects perpendicularly to a direction where said 1st and 2nd end-connection children are arranged at a single string. Said two or more 2nd end-connection children While being located in both sides of the 1st connection terminal block arranged by said 2nd base section at intervals of abbreviation identitas with said 1st end-connection child, and said 1st connection terminal block A flexible substrate characterized by including the 2nd connection terminal block arranged at a gap smaller than said 1st connection terminal block is offered, so that it goes to both ends of said 2nd base section from said 1st connection terminal block.

[0022] According to this invention, to abbreviation parallel mutually on the 1st base section further again and by carrying out thermocompression bonding to an electrode substrate equipped with two or more 1st end-connection children arranged at equal intervals The 2nd base section formed in a flexible substrate connected electrically and mechanically of a member which has a larger coefficient of thermal expansion than said 1st base section, With two or more 2nd end-connection children who each other are arranged by abbreviation parallel and connected to said two or more 1st end-connection children on said 2nd base section, respectively It has a scale formed in the direction which intersects perpendicularly to a direction where said 1st and 2nd end-connection children are arranged at a single string. Said two or more 2nd end-connection children A flexible substrate characterized by including the 1st connection terminal block arranged by said 2nd base section at intervals of abbreviation identitas with said 1st end-connection child and the 2nd connection terminal block arranged at a gap smaller than said 1st connection terminal block while being located in both sides of said 1st connection terminal block is offered.

[0023] Furthermore, in order to accept a picture signal in a display means to display an image according to a picture signal, and said display means according to this invention On the 1st base member, to abbreviation parallel And an electrode substrate equipped with two or more 1st end-connection children arranged at equal intervals, The 2nd base member formed of a member which has a larger coefficient of thermal expansion than said 1st base member, A driving means which supplies a picture signal to said electrode substrate since it prepares for this 2nd base member and said display means is driven, With two or more 2nd end-connection children who each other are arranged by abbreviation parallel and connected to said 1st end-connection child on said 2nd base section, respectively A scale formed in the direction which intersects perpendicularly to a direction where said 1st and 2nd end-connection children are arranged at a single string, A connecting means which connects respectively electrically and mechanically said 1st end-connection child and said 2nd end-connection child by being inserted between a flexible substrate which ****, and said electrode substrate and said flexible substrate, and carrying out thermocompression bonding of said both substrates, A preparation and the 2nd end-connection child of said flexible substrate While being located in both sides of the 1st connection terminal block arranged by said 2nd base section at intervals of abbreviation identitas with said 1st end-connection child, and said 1st connection terminal block A display characterized by including the 2nd connection terminal block arranged at a gap smaller than said 1st connection terminal block is offered, so that it goes to both ends of said 2nd base section from said 1st connection terminal block.

[0024] In order to accept a picture signal in a display means to display an image according to a picture signal, and said display means further again according to this invention On the 1st base member, to abbreviation parallel With and two or more 1st end-connection children arranged at equal intervals A scale formed in the direction which intersects perpendicularly to a direction where this 1st end-connection child is arranged at a single string, A preparation ****** substrate and the 2nd base member formed of a member which has a larger coefficient of thermal expansion than said 1st base member, A driving means which supplies a picture signal to said electrode substrate since it prepares for this 2nd base member and said display means is driven, With two or more 2nd end-connection children who each other are arranged by abbreviation parallel and connected to said 1st end-connection child on said 2nd base member, respectively A connecting means which connects respectively electrically and mechanically said 1st end-

connection child and said 2nd end-connection child by being inserted between a flexible substrate which ****, and said electrode substrate and said flexible substrate, and carrying out thermocompression bonding of said both substrates, A preparation and the 2nd end-connection child of said flexible substrate While being located in both sides of the 1st connection terminal block arranged by said 2nd base member at intervals of abbreviation identitas with said 1st end-connection child, and said 1st connection terminal block A display characterized by including the 2nd connection terminal block arranged at a gap smaller than said 1st connection terminal block is offered, so that it goes to both ends of said 2nd base member from said 1st connection terminal block.

[0025]

[Embodiment of the Invention] Hereafter, with reference to a drawing, the gestalt of operation of the 1st of the display using the flexible substrate and this flexible substrate of this invention is explained to details. Drawing 5 is drawing showing the liquid crystal display as an example of a display roughly. As shown in drawing 5 , the liquid crystal display has TCP20 equipped with the actuation circuit 40 which functions as a driving means for driving this liquid crystal panel 10 as the liquid crystal panel 10 which functions as a display means to display an image according to a picture signal, and a flexible substrate etc.

[0026] Opposite arrangement is carried out at the array substrate 13 with which two or more pixel electrodes were arranged in the shape of a matrix, and this array substrate 13, and the liquid crystal panel 10 of a liquid crystal display is formed in the gap of the opposite substrate 14 with which the counterelectrode was formed, and the array substrate 13 and the opposite substrate 14 with the liquid crystal constituent with which it filled up as a light modulation layer.

[0027] This array substrate 13 has two or more pixel electrodes connected to two or more TFT(s) and these TFT(s) through that source electrode on transparent insulating substrates, such as a glass substrate. moreover, every arranged by the line writing direction on this array substrate 13 -- every arranged in the 480 scanning lines connected common to the gate electrode of TFT, and the direction of a train -- 640x3 signal lines connected common to the drain electrode of TFT, 480 auxiliary capacity lines which are arranged so that a pixel electrode may be faced through an insulating layer, and constitute the auxiliary capacity Cs are arranged.

[0028] The array substrate 13 includes the substrate inlet connection 11 formed in the periphery section which the opposite substrate 14 has not countered. This substrate inlet connection 11 has two or more scanning lines pulled out from two or more TFT(s) arranged on the array substrate 13, and a signal line. The substrate inlet connection 11 is formed as some array substrates 13, and is formed according to the same construction material as the array substrate 13, i.e., a glass substrate. the substrate inlet connection 11 -- two or more end-connection children -- abbreviation parallel -- and it has the 1st connection terminal block 12 formed at equal intervals. This 1st connection terminal block 12 is formed with metals, such as ITO (Indium Tin Oxide) and aluminum. The 1st connection terminal county 12 is simultaneously formed, in case TFT etc. is formed on the array substrate 13.

[0029] TCP20 has the actuation circuit 40 which generates the scan signal supplied to the scanning line of the 1st connection terminal block 11, or the picture signal supplied to the signal line of the 1st connection terminal block 11. This actuation circuit 40 is mounted on the base member which constitutes TCP20.

[0030] While pasting up TCP20 on the substrate inlet connection 11 mechanically with the anisotropy electric conduction adhesion film mentioned later, the actuation circuit 40 mounted in TCP20 is electrically connected to the 1st connection terminal block 12 of the substrate inlet connection 11.

[0031] moreover, the base member 21 of the shape of a film in which TCP20 was formed with the resin of a member with a larger coefficient of linear expansion than a glass substrate, for example, a polyimide system, as shown in (a), (b), and drawing 2 of drawing 1 and two or more end-connection children -- abbreviation parallel -- and it has the 2nd connection terminal block 22 arranged on the base member 21 in the predetermined pitch. The 2nd connection terminal block 22 is divided into two or more blocks, is the predetermined pitch specified by the method of mentioning later for every block, and is formed with metals, such as copper. First, the 2nd connection terminal block 22 is formed in TCP20 by etching into a predetermined configuration, after sticking the copper foil to which adhesives 23 were applied on the base

member 21.
[0032] The substrate inlet connection 11 and TCP20 of a liquid crystal panel 10 are pasted up with the anisotropy electric conduction adhesion film 30 which intervened among both. The anisotropy electric conduction adhesion film 30 has the conductive particle 32 distributed in the thermosetting adhesives 31 and adhesives 31.
[0033] After the substrate inlet connection 11 and TCP20 have been arranged through the anisotropy electric conduction adhesion film 30 so that the 1st and 2nd connection terminal blocks 12 and 22 may counter mutually, by carrying out thermocompression bonding, TCP20 with a large coefficient of linear expansion expands, and they are electrically connected to each end-connection child of the 2nd connection terminal block 22 to which each end-connection child of the 1st connection terminal block 12 corresponds, respectively through the conductive particle 32 at drawing 2 so that it may be shown. Moreover, as shown in drawing 2 , it is desirable [the 2nd connection terminal block 22 of TCP20] that it is smaller than the width of face of the 1st connection terminal block 12 of the substrate inlet connection 11, so that it can flow electrically, even if the 1st and 2nd connection terminal blocks 12 and 22 shift somewhat and are connected after thermocompression bonding.
[0034] Next, the convention method of the pitch of the connection terminal block formed on TCP20 is explained. As shown in drawing 3 , the nonlinear function Q can express the relation with amount of gaps deltaL of the 2nd connection terminal block 22 on TCP20 connected by the distance L and thermocompression bonding from the center of the 2nd connection terminal block 22 in TCP20 to the end-connection child of arbitration, and the 1st connection terminal block 12 on a glass substrate 11. That is, this nonlinear function Q means that the both ends of a substrate expand more greatly than near a center section, in case thermocompression bonding of TCP20 is carried out.
[0035] And this nonlinear function Q is approximated by plurality P1, P2, and P3, for example, three straight lines. These three approximation straight lines are based, the 2nd connection terminal block 22 is divided into three blocks, and an end-connection child's pitch is specified for every block.
[0036] It has the 1st block of the end-connection child of one N of the 2nd connection terminal block 22 by whom 24 is arranged from the center L0 of the 2nd connection terminal block 22 before L1. 25 has the 2nd block of the end-connection child of two N arranged from L1 before L2. 26 has the 3rd block of the end-connection child of three N arranged from L2 before L3.
[0037] The 1st block, the pitch W21 of each end-connection child of 24 is W21=W10-[A1/{(N 1-1) /2}], when the pitch of the 1st connection terminal block 12 on A1 and a glass substrate 11 is set to W10 for the amount of gaps in the intersection L1 of straight lines P1 and P2.
It comes out and is prescribed by the formula expressed.
[0038] The 2nd block, the pitch W22 of each end-connection child of 25 is W22=W10-[(A2-A1) / {(N 2-1) /2}], when the amount of gaps in the intersection L2 of a straight line P2 and a straight line P3 is set to A2.
It comes out and is prescribed by the formula expressed.
[0039] The 3rd block, the pitch W23 of each end-connection child of 26 is W23=W10-[(A3-A2) / {(N 3-1) /2}], when the amount of gaps in L3 is made into A3.
It comes out and is prescribed by the formula expressed.
[0040] That is, in consideration of expanding, in case thermocompression bonding of the 2nd connection terminal block 22 formed on the base member 21 of TCP20 is carried out, an end-connection child's pitch is designed small beforehand. An end-connection child's pitch is small formed, so that it goes to both ends from the center section of TCP20, as TCP20 shows drawing 1 , since both ends tend to expand from a center section. The size relation of the pitches W21, W22, and W23 of the 1st thru/or an end-connection [in / the 3rd block / 24, 25, and 26] child can be expressed as W21>W22>W23.
[0041] Therefore, in case thermocompression bonding of TCP20 is carried out to the glass substrate 11 of a liquid crystal panel 10, it expands by heating TCP20 and a glass substrate 11, and TCP with a big coefficient of linear expansion expands greatly. At this time, since the both ends of TCP20 expand more greatly, by expanding, respectively, the end-connection child in whom both ends were formed in the small pitch is almost equal to the pitch of the 1st connection terminal block 12 by which the pitch is formed on

breadth and a glass substrate 11, and expands at equal intervals mostly.
[0042] For this reason, at the time of thermocompression bonding, each end-connection child in the 1st connection terminal block 12 on a glass substrate 11 is electrically connected through the conductive particle 32 of the anisotropy electric conduction adhesion film 30 while he pastes certainly mechanically each end-connection child in the 2nd connection terminal county 22 on TCP20 who corresponds, respectively.
[0043] Next, the display applied to the gestalt of implementation of the 2nd of this invention with reference to drawing 4 is explained. In addition, the same component as the gestalt of the 1st operation attaches the same reference mark, and detailed explanation is omitted.
[0044] TCP20 equipped with the 2nd connection terminal block 22 has the scale 15 formed in the direction which intersects perpendicularly to the direction where the 2nd connection terminal block 22 is arranged at a single string. As for this scale 15, the graduation is formed in the pitch of 10 micrometers.
[0045] When carrying out thermocompression bonding of the 2nd connection terminal block 22 of TCP20, and the 1st connection terminal block 12 of a glass substrate 11, alignment of the 2nd connection terminal block 22 of TCP20 is carried out to the 1st connection terminal block 12 of a glass substrate 11. This alignment is performed by viewing through an optical instrument.
[0046] The length to an end-connection child formed in the other end from the end-connection child formed in the accumulation pitch 50 of the 2nd connection terminal block 22 on TCP20, i.e., the end section on TCP20, may be formed for a long time or short to the accumulation pitch 60 of the 1st connection terminal block 12 currently formed on the glass substrate.
[0047] At this time, each substrates 11 and 20 double a location so that the center section of the 1st and 2nd connection terminal blocks 12 and 22 may be mutually in agreement, and further, alignment is carried out so that the amount of gaps in the both ends of each substrates 11 and 20 may become equal. It is possible to read with the scale 15 by which the amount of gaps of both ends was formed on the base member 21 of TCP20 at the time of this alignment, and the amount of gaps can be uniformly assigned to the both ends of a substrate like before, without depending on an operator's sensation. Like the gestalt of this operation, when the gap of a scale is formed in 10 micrometers, in the center section of the connection terminal block, the alignment precision of 5 micrometers or less can be expected.
[0048] Thus, after making the 1st connection terminal block 12 of a glass substrate 11, and the 2nd connection terminal block 22 of TCP20 counter through an anisotropy electric conduction adhesion film and carrying out location ****, while both substrates paste up mechanically by being stuck by pressure, heating a glass substrate 11 and TCP20, the 1st connection terminal block 12 of a glass substrate 11 is electrically connected to the 2nd connection terminal block 22 in TCP20 which corresponds, respectively through a conductive particle.
[0049] Therefore, precision can improve the 1st connection terminal block 12 of a glass substrate 11, and the 2nd connection terminal block 22 of TCP20 alignment, and a faulty connection can be controlled. For this reason, lowering of the yield is prevented.
[0050] In addition, since the scale 15 formed on TCP20 is used as criteria for the alignment performed before heat-treatment for thermocompression bonding, it may be formed in the glass substrate 11 side, and may be formed in both TCP20 and the glass substrate 11.
[0051] Moreover, the scale applied to the display of the gestalt of this 2nd operation may be combined with TCP of the gestalt of the 1st operation. Although this example explained each taking the case of TCP, also in flexible substrates, such as a flexible print circuit (FPC) where the actuation circuit is not mounted, it is useful.
[0052]
[Effect of the Invention] As explained above, according to this invention, the flexible substrate whose reliability can improve, and the display using this flexible substrate can be offered, without producing a faulty connection.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] (a) of drawing 1 is the plan showing roughly an example of TCP concerning the gestalt of implementation of the 1st of this invention, and (b) of drawing 1 is the side elevation of TCP shown in (a) of drawing 1 .
[Drawing 2] Drawing 2 is the cross section cut by the A-A' line after the thermocompression bonding of TCP shown in drawing 1 .
[Drawing 3] Drawing 3 is drawing showing relation with amount of gaps deltaL of the connection terminal block on TCP connected by the distance L and thermocompression bonding from the end-connection child center of group in TCP shown in drawing 1 to the end-connection child of arbitration, and two or more end-connection children on a glass substrate.
[Drawing 4] Drawing 4 is the plan and side elevation showing roughly an example of TCP with which the display concerning the gestalt of implementation of the 2nd of this invention is equipped.
[Drawing 5] Drawing 5 is drawing showing roughly the liquid crystal display as an example of the display of this invention.
[Drawing 6] Drawing 6 is the plan showing an example of the conventional TCP roughly.
[Drawing 7] Drawing 7 is the plan and side elevation of the lead section to which the conventional TCP and the display panel of a display were connected.
[Drawing 8] Drawing 8 is drawing showing relation with amount of gaps deltaL of the connection terminal block on TCP connected by the distance L and thermocompression bonding from the end-connection child center of group in the conventional TCP to the end-connection child of arbitration, and two or more end-connection children on a glass substrate.
[Drawing 9] Drawing 9 is the plan showing an example of the conventional TCP roughly.
[Description of Notations]
10 -- Display panel
11 -- Substrate inlet connection (glass substrate)
12 -- Connection terminal block
13 -- Array substrate
14 -- Opposite substrate
15 -- Scale
20 -- TCP
21 -- Base member
22 -- Connection terminal block
23 -- Adhesives
24 -- The 1st block
25 -- The 2nd block
26 -- The 3rd block
30 -- Anisotropy electric conduction film
31 -- Heat-curing adhesives
32 -- Conductive particle
40 -- Actuation circuit

[Translation done.]